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ABSTRACT

In light of various signs indicating significant enrollment growth in California higher education, this study reviewed nine available projections of undergraduate enrollment for California public higher education. The study reviewed enrollment forecasts from the California Department of Finance, the California Postsecondary Education Commission, the University of California (UC), an independent projection prepared for the UC campuses, California State University, California Community Colleges, the RAND Corporation, the National Center for Higher Education Management Systems, and the Western Interstate Commission on Higher Education. The study concluded that California should plan for a total undergraduate enrollment increase of about 488,000 students in the next decade, an increase from a total of 1.7 to 2.2 million students. This includes growth of about 29,000 students at the University of California, 74,000 students at the California State University, and 385,000 at the California Community Colleges. Forecasts were made in light of California's historical policy of assuring higher education opportunity for those who are motivated and qualified. The study also noted that this policy significantly drives enrollment projections, that there was significant agreement among the different projections, that segmental policies impact other segments, and that segmental policies affect "demand" for educational services. An appendix lists panel-members who conducted the review. (JB)

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TIDAL WAVE II

An Evaluation of Enrollment Projections for California Higher Education

A Report from

THE CALIFORNIA HIGHER EDUCATION POLICY CENTER

September 1995

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TIDAL WAVE II

An Evaluation of Enrollment Projections for California Higher Education

by
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Technical Report #95-6
The California Higher Education Policy Center

September 1995

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Foreword

Every analysis of key demographic trends predicts that California's higher education enrollments will increase significantly during the next decade and beyond. The state's population growth during the 1980s, the recent surge of public school enrollments, as well as improvements in high school graduation rates and in the proportion of high school graduates who have completed a college prep curriculum are all indicators that the State of California and its colleges and universities must plan for additional enrollments, the largest potential growth since the baby boomers.

While no one we know takes issue with the need to plan for growth, there are disagreements about the magnitude of enrollment increases, the years in which the major enrollment demand will occur, and the likely impact upon the community colleges, the state university, the University of California, and the state's private colleges and universities. On one level, the disagreements are technical in nature—arguments among demographers and enrollment forecasters. Embedded in the assumptions and methodologies of the various projections, however, are policy issues of momentous significance to the State of California. Will California provide the same level of college opportunity to the next generations of young people that was provided to others over the past thirty-five years? Or will the current pattern of discouraging college attendance through reduced state funding, higher tuition and institutional "downsizing" drive down college attendance? Will the pattern of the last decade—regarding steady growth in the percentage of high school graduates qualified for college—continue? Or will the reduction of college opportunity discourage California's high school students from taking the more rigorous college preparatory curriculum?

Thus, the enrollment projections and their underlying assumptions have major significance not only for policy makers, but for all Californians. If, for instance, enrollment demand is underestimated, the result may be that many qualified students will be denied the opportunity to attend college because the needed capacity will not have been developed. On the other hand, if enrollments are significantly overestimated, millions of public dollars may be spent on developing excessive capacity—new campuses and buildings that are not needed. Yet, despite their importance, enrollment projections are, at best, estimates based on informed assumptions about human behavior, public policy and economic and social trends.

In July 1995 the California Higher Education Policy Center convened an independent panel of experts to review all available projections of undergraduate enrollment for California public higher education. (No enrollment forecasts were available for California's private colleges and universities.) The panel was asked to offer its best advice on the levels of enrollments that should be anticipated, consistent with California's historic policy of assuring higher education opportunity for those who are motivated and qualified. Although the Center convened the panel and is the direct recipient of its advice, it is our hope that the panel's work will be helpful to all the institutions and organizations responsible for planning for the future of California higher education.

The panel, after examining nine sets of enrollment forecasts, concluded that California should plan for a total undergraduate enrollment increase of approximately 488,000 students in the next decade—an increase from a total of 1.7 to 2.2 million students. This includes growth of about 29,000 students at the University of California, 74,000 at the California State University, and 385,000 at the California Community Colleges. These projections were produced by the California Postsecondary Education Commission. They are similar to those made by the state Department of Finance, but they vary considerably from those made by the University of California and the California Community Colleges. The university's analysts have projected almost 19,000 fewer students for the university than the panel and CPEC recommend for 2005/06, and the community colleges' forecast is almost 160,000 above the CPEC and panel recommendations.

The panel notes in the report that its recommended enrollment projections are influenced by assumptions about public policy. The panel was guided by the state policy commitment of the 1960 Master Plan to provide educational opportunity to all qualified students. Accordingly, the panel recommends enrollment projections that provide for the level of educational service needed, rather than those projections that embody extensions of current trends or that incorporate restrictive, unalterable policy assumptions. The panel notes:

> We do not present as acceptable any set of forecasts that assume unalterable supply constraints in the educational delivery system or in the priorities set by the state's public colleges and universities. We view any set of assumptions that would exclude hundreds of thousands of young Californians from higher education to be morally, politically, and economically unacceptable.

Further, as an important caveat, the panelists note that all of the enrollment projections discussed in this report are largely policy driven. For instance, small differences in assumptions about participation rates among African-American and Latino students—which reflect important attitudes about public policy—play a much larger role in the projections than do any of the technical or

methodological differences between them. A crucial component of this finding, moreover, is the panel's observation that internal actions by the community colleges, Cal State, or the University of California—regardless of statewide policies concerning access—play a vital role in enrollment patterns. As the report states, "because segmental policies affect future enrollment demand, the segments have many ways to make their own enrollment projections self-fulfilling. Recruitment and retention activities are obvious examples of this fact."

The panel also suggests that a second set of figures be considered, based on the assumption that changes of the last five years will not be reversed but that the sharp increases in student fees and the precipitous decline in access will not continue to occur. Even under this scenario, which the California Postsecondary Education Commission has called its "low alternative" projection, total undergraduate enrollment would increase by almost 371,000 over the next ten years: by over 24,000 at the University of California; 48,000 at Cal State; and 298,000 at the community colleges.

The three-member panel was chaired by David Breneman, university professor and dean of the Curry School of Education at the University of Virginia. Leobardo Estrada, associate professor in the Graduate School of Public Policy and Social Research at UCLA, and Gerald Hayward, director of Policy Analysis for California Education, were the other panel members. (Further biographical information on the panelists can be found in the appendix.)

The Center invited public and private organizations and individuals responsible for developing current enrollment projections to discuss their findings and methodologies with panel members. The participants were invited to answer questions from panel members and review draft descriptions from the panel's report. The panel members, however, assume responsibility for the content and recommendations of this report.

The Center and the panelists express appreciation to the following individuals for their assistance to the panel, for their responsiveness to the questions raised by the panel, and for their thoughtful comments and advice: Michael Shires, representing the RAND Corporation and now with the Public Policy Institute of California; Mary Heim, assistant chief from the Department of Finance Demographic Research Unit; Sandra Smith, assistant vice president for planning at the University of California; Calvin Moore, professor of mathematics at the University of California, Berkeley; Dennis Jones, executive director of the National Higher Education Management Systems (NCHEMS); Philip Garcia, associate director of analytic studies at the California State University; Judy Walters, vice chancellor for policy analysis and development, and Chuen-Rong Chan, research specialist, at

the California Community Colleges; and Stacy Wilson, senior policy analyst at the California Postsecondary Education Commission (CPEC).

The California Higher Education Policy Center is particularly grateful to the members of the panel. We believe their process of consultation and the results of this report represent contributions to the Center's work and to the future of California higher education.

The Center welcomes the reactions of readers to this report.

Joni E. Finney
Associate Director

The State of California is faced with a projected surge in college enrollments that has become known as Tidal Wave II. As educators and policy makers in California debate the nature and timing of changes required to serve the additional students, they have been hampered by the lack of an agreed-upon set of enrollment forecasts. The problem does not spring from a lack of projections; instead, a wealth of conflicting forecasts has created confusion about the size and timing of future enrollment growth. In an effort to shed light on this complicated topic, the California Higher Education Policy Center asked the three of us to serve as an expert panel to review and evaluate the several projections that exist, and provide our best judgment about the most plausible forecast of future demand for undergraduate education in the state. This report is our response to that request.

We collected copies of every recent enrollment projection of which we were aware, reviewed them separately, and then met as a panel for two days in July 1995. During those two days, we interviewed and questioned representatives of each organization that had produced a projection. We sought to understand the assumptions underlying each effort, the data base(s) used, the timelines covered, and the projection methodologies employed. We have not attempted to produce our own projection, but rather to indicate which sets of numbers we find most plausible, and why.

Background

In the late 1980s, enrollments in public higher education in California were projected to increase by 750,000 students into the next century, and plans were being made to build from 15 to 22 new campuses to accommodate this growth. The onset of prolonged recession in the early 1990s produced both economic and demographic changes that prompted a recent reduction of this number to 450,000. The fiscal squeeze on the state's finances put an end to plans for most new campuses, and the weak economy significantly slowed the rate of net migration into California. Each year during the 1990s, the state Department of Finance has sharply reduced its estimates of the number of high school students who will graduate in California during the next decade, and these numbers form the basis for most college enrollment projections. Recently, the University of California (UC) produced its own projection that enrollment growth for its campuses would drop from an earlier estimate of

60,000 new students to just over 17,000 by 2005/06, a decline in growth rate from 40 to 12 percent. The California Community Colleges (CCC), by contrast, projected their numbers to increase by nearly 160,000 more than earlier forecasts. Other parties, notably the California Postsecondary Education Commission (CPEC) and the RAND Corporation, have produced projections at odds with the above. In addition to accounting differently for the shifting forecasts of future high school graduates, the projections differ in their judgments about the impact of recent—and pending—fee increases, participation rates by racial and ethnic groups, and state financial support. It is within this context of sharply changing numbers and divergent assumptions that our panel entered the discussion.

A Note on Projections

Before we present enrollment data, a few words are needed to clarify the different types and purposes of projections.

1. Projections as predictions.

Some projections are presented as predictions (or forecasts) of actual events. As an example, such a projection might present a series of estimates of actual undergraduate enrollments in California by year, and later could properly be evaluated by how accurate the forecast turned out to be. In order to make such a forecast, the analyst would have to estimate both the demand for and supply of undergraduate spaces, and would have to factor in judgments about price effects caused by fee increases and changes in the economic return—hence attractiveness—of higher education. Obviously, such an effort is complex and the history of such attempts in higher education is replete with sizable forecasting errors. Social science has simply not advanced far enough to capture all of the interacting variables that produce actual enrollments.

2. Projections as extensions of current trends.

A less ambitious type of projection does not attempt to forecast actual enrollments, settling instead for a simple projection of current trends, often for the purpose of pointing out the implausibility of sustaining the current pattern of growth. Projections concerning the numbers of Ph.D.s produced often fit this pattern, as analysts point out that current growth rates will result in such large numbers of new doctorates that it is implausible that the labor market can absorb them all. The purpose of such projections is to stimulate actions that render the projections inaccurate as forecasts. In relation to this example, the presumption would be that, in response to the projection of excess supply of new Ph.D.s, universities would cut doctoral enrollments, students would be less willing to enroll, and state

and federal governments would reduce support of doctoral education, thereby causing doctoral production to decline.

One of the most common errors that analysts make is to fail to maintain the difference between projections as predictions and projections as extensions of current trends. In this situation, an analyst claiming to be basing a projection on extensions of current trends, might inappropriately introduce adjustments in an attempt to forecast actual events more accurately.

3. Projections that embody policy decisions.

Analysts might produce projections that appear to be neutral in their value judgments, while actually incorporating restrictive assumptions that alter the outcome. An example might be a judgment made about the college participation rates of racial or ethnic minority students. The analyst might conclude that current participation rates will not change over the projection period, when in fact such rates are responsive to policy changes. Often, assumptions must be made to produce projections, but analysts bear the responsibility of explaining their assumptions and discussing alternatives if readers are to form accurate judgments about the quality and robustness of their projections.

An alternative way to think about the different types and purposes of projections is to consider them in relation to the economist's concepts of supply and demand. At the most basic level, a projection can ignore the supply (institutional) side of the market, and concentrate solely on the size of the population in need of service. Under such circumstances, one might examine the projections of high school graduates and make assumptions about the college participation rates of various sub-groups within that population, while ignoring the possible effects of fee increases, space constraints, or adverse enrollment decisions made by the institutions. The 1960 Master Plan for Higher Education has operated largely on this basis, guaranteeing access to college to all students desiring to enroll, with new campuses built to meet the demand. For 30 years (1960 to 1990) tuition and fees were kept low (or non-existent) as a part of the commitment to access. The last five years have seen a change in this policy; as state budgetary support has declined, courses have been canceled, fees sharply increased, and admissions constraints added. An analyst trying to forecast enrollments might properly accept the recent policy shifts and project accordingly; alternatively, one could reject the recent policy changes and project the number of students who would be expected to enroll were the policies of 1960 to 1990 still in effect.

Any approach focusing on the population requiring services and ignoring the supply side is a measure of need, not of market demand. The concept of demand introduces prices into the equation,

thereby requiring the analyst to make assumptions about the impact of price increases during the past five years and in the future. This approach—concentrating on need—could properly be followed while ignoring the supply side if one assumes that whatever demand is forecast will be met by an adequate supply of places, courses, faculty, equipment, library facilities, and so forth. On the other hand, an analyst could attempt to incorporate assumptions about the supply side as well, which, under the present circumstances in California, would further reduce the forecast level of enrollments. Each of these approaches is valid so long as the analyst is careful to explain which method is being followed and what assumptions are being made.

The Panel's Approach

The enrollment projections that the panel recommends to The California Higher Education Policy Center in this report are estimates of the level of education service needed to meet the goals of the 1960 Master Plan. Most importantly, those goals include a place for all eligible students in a state college or university. No public official has announced the end of the Master Plan, and we believe that as a first approach, the Center should be basing policy recommendations on projections that reflect a continuing commitment to broad access. A second set of projections are presented that are based on the assumption that the financial changes of the last five years will not be reversed, but that supply constraints or sharp fee increases will not continue to occur. In this version, the changes of the past five years are not rolled back, but access does not continue to deteriorate. We do not present as acceptable any set of forecasts that assume unalterable supply constraints in the educational delivery system or in the priorities set by the state's public colleges and universities. We view any set of assumptions that would exclude hundreds of thousands of qualified young Californians from higher education to be morally, politically and economically unacceptable.

Projections Reviewed by the Panel

The panel reviewed the following projections:

1. California Department of Finance, projections of future high school graduates and enrollments by public segment (i.e., UC, CSU, CCC).
2. California Postsecondary Education Commission, projections of enrollments by segment.
3. University of California, Office of the President, projections for enrollment at the UC campuses only.
4. Clark Kerr and Cal Moore, independent projections prepared for the UC campuses only.
5. California State University, Chancellor's Office, projections of enrollments at Cal State only.
6. California Community Colleges, Chancellor's Office, projections for the community colleges only.
7. RAND Corporation, projections prepared by Michael Shires, a former member of the RAND staff, now at the Public Policy Institute of California.
8. National Center for Higher Education Management Systems, projections of total enrollments prepared in 1993 for the California Higher Education Policy Center.
9. Western Interstate Commission on Higher Education, projections of high school graduates to 2008.

In relation to the above list, several projections have been made by the public segments for their campuses alone, while others cover the entire public system (and some include enrollments in the independent colleges and universities of California). Projections of one segment alone have the inherent limitation that they do not map the interaction of student flows from one segment to another (for instance, the impact on the Cal State and community college segments if the UC system adopts tighter enrollment standards. Projections that take into account all segments are to that extent superior.

In the following sections, we present our evaluations of each of these projections.

1. State of California, Department of Finance

The state Department of Finance (DOF) provides annual projections of future high school enrollments and graduates to the year 2003 for all college and university segments—the California Community Colleges, the California State University, and the University of California. The accuracy of the department's 1994 projection series of high school graduates is important to others who use them as a basis for their own independent projections.

The Department of Finance's methodology has been faulted for its reliance on annual enrollment data from the California Basic Education Data System (CBEDS). CBEDS has been criticized for failing to standardize its data collection and for rarities in the enrollment data at the county level (for instance, having more graduates than enrolled seniors). Aware of these problems, the Department of Finance assumes that errors are offset at the state level. The department uses CBEDS data to calculate grade progression ratios which measure the number of children who enroll at any grade level from the prior year's grade level. Implicitly, these ratios account for in-migration (when the ratio exceeds 1.0) and attrition (when the ratio is less than 1.0). One important exception to this method is the ratio that represents the number of children who enroll in the first grade in relation to births six years earlier. Over the past decade, the number of children who enroll in first grade has been less than expected based on births six years prior. The numerical gap has ranged from 30,000 to 40,000 at the state level. This sharp loss—decreasing grade progression ratios and descending net migration flows—has resulted in declining projections for the state population and related K–12 enrollment and high school graduates since 1991.

The Department of Finance's data are longitudinal and the department provides enrollment, graduation, and participation rates by race and ethnicity. Participation rates are determined by allocating future high school graduates based on past enrollment of first-year students in each of the college and university segments. The department's projections generally assume a slight rebound in participation rates to 1990 levels.

There are significant difficulties with the data and projections produced by the Department of Finance. For instance, over the years, the department has used different time ranges for its projections. Also, the department no longer provides projections of private school enrollment, graduation, and participation rates. Further, the department simply assumes—based on past trends—that private high school graduates will account for 10 percent of undergraduate enrollment. The department's selection of the most fitting projection regression from among ten options remains an unexplained subjective process. Most troublesome, however, is the department's projection

methodology, which is slow to respond to shifts in birth rates and net migrations, and thus experiences sharp declines and upswings.

DOF Enrollment Projections—Undergraduates				
Year	*CCC*	*CSU*	*UC*	*Total*
1994/95	1,400,000	250,600	121,800	1,772,400
1999/00	1,522,100	270,600	131,100	1,923,800
2005/06	1,717,800	334,300	153,100	2,205,200
Growth to 2005/06	317,800	83,700	31,300	432,800

Source: DOF, *1994 Projection Series, by Segment.* The DOF numbers for 2005/06 are reported in CPEC's *California Public College and University Enrollment Demand, 1994-2005.*

2. California Postsecondary Education Commission

The California Postsecondary Education Commission (CPEC) provides annual projections of enrollments to the year 2005 by race and ethnicity for all college and university segments. Unlike other projection systems, CPEC provides two separate projections, a "baseline" projection and a "low alternative" projection. The difference between the baseline and low alternative projections is that the baseline model projects a "rebound" in college participation rates, while the low alternative projection assumes only a "modest upswing." By the year 2000, for example, the CPEC baseline projection assumes that Latinos and African-Americans will each increase their college participation rates by one percent, and remain constant thereafter.

The CPEC model for projecting enrollment demand for the UC and CSU systems is based on a student flow model. CPEC begins with estimates of first-time freshmen and transfer students based on anticipated demographic changes within California, historical college participation rates, and projected increases in student eligibility. The flow of students from entry through final departure from each university system is simulated using actuarial analyses that involve the use of "life tables" as the basis for the study of continuation, attrition, and graduation rates. Because these life tables explicitly include the intake of new students, either as first-time freshmen or undergraduate transfers, enrollment demand can be related to projections of community college enrollment, and to the Department of Finance's projections of public high school graduates.

The CPEC model controls for four major sources of variation in enrollment demand: racial/ethnic group, age group, level of admission (freshman or transfer), and college preparation (regular admit or special action admit).

Since 1990, CPEC's projections for community colleges have been based on term-end count rather than census head count, which the Department of Finance and the community colleges use. Enrollment demand for community colleges is based on an adult population participation model rather than a student flow model used for other segments. Historical community college participation rates are computed by dividing age-specific and race/ethnic-specific enrollments by the corresponding California adult cohort.

For community colleges, CPEC's baseline projection reflects a full recovery of college participation rates to their 1989–1992 averages for community college students who did not already have a baccalaureate degree, and a partial recovery (60 percent) of college participation rates for community college students with baccalaureates (due to the $50 per unit fee). CPEC's low alternative projection returns rates to approximately the midpoint of the actual 1993 rate and the baseline projection rate for fall 2005.

CPEC Baseline Enrollment Projections—Undergraduates

Year	*CCC*	*CSU*	*UC*	*Total*
1994/95	1,337,085	261,508	123,873	1,722,466
1999/00	1,525,501	277,894	131,551	1,934,946
2005/06	1,722,170	335,396	152,930	2,210,496
Growth to 2005/06	385,085	73,888	29,057	488,030

Source: CPEC, *California Public College and University Enrollment Demand, 1994–2005.*

CPEC Low Alternative Enrollment Projections—Undergraduates

Year	*CCC*	*CSU*	*UC*	*Total*
1994/95	1,335,800	259,979	119,975	1,715,754
1999/00	1,457,024	265,706	123,983	1,846,713
2004/05	1,604,397	300,254	141,169	2,045,820
2005/06	1,633,986	308,267	144,169	2,086,422
Growth to 2004/05	268,597	40,275	21,194	330,066
Growth to 2005/06	298,186	48,288	24,194	370,668

Source: CPEC, *California Public College and University Enrollment Demand, 1994–2005.*

3. University of California, Office of the President

The University of California has projected its undergraduate enrollment to the year 2005 by applying a constant participation rate to the Department of Finance's high school graduation projections. Other models considered but discarded by the university include an average participation rate projection and a declining participation rate projection.

Looking to the future, the university expects three periods of enrollment growth: (1) an initial period of stabilization (1995–1997); (2) a period of modest growth (1998–2005); and, (3) a period of increased and dramatic growth (2006–2010).

Because the latest projections are far below prior projections, the university asserts that it is necessary to re-examine the assumptions from their own 1988 projection study. In 1988, the state Department of Finance projected a 43 percent increase in the number of high school graduates from 1988 to 2005 and a 37 percent increase in undergraduate enrollment for the university. The department's 1994 projections of public high school graduates, however, are 18 percent below the forecasts at the time the university's 1988 plan was adopted. This change in projected high school graduates has the effect of deferring the crest of Tidal Wave II from 2005 to 2010.

In 1988, both the Department of Finance and the University of California assumed that the high proportion of high school graduates choosing to attend the university, which reached an all-time peak of 9.8 percent in 1986, would be sustained and would possibly slightly increase. Since then, however, UC participation rates for freshmen have fallen significantly (to 8.3 percent in 1993), and the university now considers it unrealistic to justify projecting future enrollment based on the historically high rates of the mid-1980s. The primary reasons given to explain why participation rates have declined over the past few years and/or are unlikely to increase significantly over the next decade include:

1. the narrowing of the tuition differential between public and private institutions;
2. the changing composition of high school graduating classes, with more non-traditional students, such as first-generation college students from poorer families, who are likely to enroll in local colleges closer to home;
3. over-subscription to UC Berkeley and UCLA, which deflects enrollment to non-UC institutions;
4. no change in the proportion of UC-eligible students choosing to attend community colleges for their lower-division course work; and
5. even as Latino and African-American students comprise more of the high school graduation class, these graduates have the lowest full eligibility rates. Latino and

African-American students who are eligible enroll in the UC system at rates far below the average for all incoming students.

Not surprisingly, the university's latest projections are more modest than their 1988 projections. The university assumes that freshman participation rates, on average, will remain constant at 8.3 percent over the next decade, resulting in an undergraduate enrollment of 134,000 by 2005, or an increase of 17,500 over current enrollments; by comparison, the university's 1988 projection was for 158,800 undergraduates by 2005, or an increase of about 40,000 undergraduates over current (1994/95) enrollments.

The university's projections are below those put forward by the Department of Finance and by CPEC's baseline or lower alternatives, all of which are based on the assumption that freshman participation rates will rise. The university is skeptical about any overall increase in participation rates. Even though the dampening effects of the recession are "bottoming out" and participation rates may not decline further, independent and out-of-state universities continue to attract UC-eligible students. From the university's point of view, there is no evidence of any shift in enrollment away from these competitive institutions back to the UC system to such a degree that would significantly increase participation. Furthermore, until the UC eligibility rates of African-American and Latino students improve, there can be no significant increase in their participation rates since the university enrolls virtually all eligible students from these two groups who choose to attend a UC campus.

UC Enrollment Projections —Undergraduates

Year	*UC*
1994/95	116,646
1999/00	122,849
2004/05	132,104
2005/06	134,023
Growth to 2004/05	15,458
Growth to 2005/06	17,377

Source: UC, *Anticipating Enrollment Growth: How Much? How Soon?*

4. University of California (Kerr/Moore)

Clark Kerr and Cal Moore have developed enrollment projections for the UC system to the year 2010. Kerr and Moore's projections have several distinct components. Unlike others who rely on projecting the number of first-time freshmen from the Department of Finance's projections of future California high school graduates, Kerr and Moore's UC undergraduate participation rate is derived by the following formula: 1.05 times the head count of undergraduate enrollment divided by the California high school graduates (actual and projected by the Department of Finance) over the past five years. Kerr and Moore argue that this method accounts more accurately for attrition and transfer students. Finally, they take into consideration the number of undergraduates who re-enroll from year to year. The formula utilized by Kerr and Moore considers undergraduate enrollment to be a function of participation rates of high school graduates over the previous five years. The participation rate reflects the percentage of California high school graduates the University of California educates.

Kerr and Moore assume that private high school graduates will account in the future for 9 to 10 percent of all high school graduates.

Kerr and Moore note that participation rates were at the six percent level for two decades before the late 1970s, and then rose sharply to 9.7 percent in 1990. Since then, participation rates have been declining, and they assume that the rates will never attain the 10 percent level again, but will level off in a range from 7.5 to 8.3 percent. Kerr and Moore argue that participation rates in this range are realistic because of "downward pressures" on UC undergraduate enrollment, including: the declining "tuition gap" between public and private institutions; tightened standards; historically lower participation rates among first generation college students; and over-subscription at the UC Berkeley and UCLA campuses that deflects enrollment to community colleges and CSU institutions. They also argue that, using measures consistent with the Master Plan, the university could manage enrollments in a way so that participation rates would decrease to 7.5 percent by 2010.

Kerr and Moore do not provide detailed tables for their projections, but it is clear that their estimates are driven primarily by the assumed participation rate. Thus, by the year 2010, if the participation rate is 7.5 percent, UC undergraduate enrollment will be 146,000. Similarly, if the participation rate is 8.3 percent, UC enrollment will be 162,000.

Finally, Kerr and Moore point out that recently decreased projections by the Department of Finance indicate that the full impact of Tidal Wave II will be postponed for about five years.

5. California State University

California State University does not generate its own independent undergraduate projections at this time. The flow model used by CPEC, however, mirrors the projection methods developed by CSU analysts. One exception is that CPEC estimates community college transfers directly as a participation rate of California's adult population, while previous CSU methods had an intermediary step—a community college participation rate was estimated for the total adult population and a separate transfer participation rate estimated from the pool of community college transfer students. This intermediate step appears justified since Cal State annually enrolls more undergraduate transfers from the pool of transfer curriculum students than first-time freshmen from the graduating senior class. Cal State does, however, convert projections of new undergraduates into projections of continuing students. Further complicating matters is the fact that CSU undergraduate enrollment is greatly affected by trends in continuing enrollment and by longer time intervals to graduation.

At this time, Cal State utilizes both the Department of Finance's 1994 projection series and CPEC's baseline undergraduate enrollment projections, which converge to very similar results by the year 2003. Both CPEC and the Department of Finance assume a return to higher 1980s undergraduate participation rates. According to these projections, Cal State's participation rate is expected to increase from 7.5 percent in 1990 to 10 percent by the year 2005.

CSU Enrollment Projections —Undergraduates

Year	*CSU*
1994/95	251,049
1999/00	260,100
2004/05	292,507
Growth to 2004/05	41,458

Source: CSU Enrollment Projections.

6. California Community Colleges, Chancellor's Office

The Chancellor's Office of the California Community Colleges generates its own enrollment projections to the year 2009 by using an econometric regression model in which head-count

enrollment is cast as a function of: (a) adult population, (b) college operating budget outlays, (c) the price to students of attending, and (d) state techniques for financing the colleges. Because community colleges have no entrance requirements, the total adult population can be regarded as part of their potential pool of students. Community colleges project enrollment based on "weekly student contact hours," and then translate that number into "head counts." The model used by the community colleges assumes that their enrollment increases are directly related to the growth of the adult population, as well as to increases in the cost of attendance and the funding for community colleges.

Improved funding and assumed moderate fee increases in other segments drive the community colleges' projections model to forecast increased enrollment in years to come. The community colleges' projections are higher than those projected by the Department of Finance and CPEC. For example, the community colleges' projected enrollment in the year 2005 is almost 160,000 higher than projected enrollments prepared by the Department of Finance and CPEC.

Community colleges have several reasons to expect sharp increases in enrollments:

1. admission requirements at CSU are likely to become more stringent,
2. CSU may severely restrict remedial classes in the near future,
3. fees are likely to continue increasing at CSU and UC institutions,
4. more adults are seeking new vocational and technical skills, and
5. the $50 fee for students with B.A. degrees sunsets on January 1, 1996.

These growth factors may be tempered if transfer rates rise as an increasingly younger student group is aggressively recruited for participation in the transfer curriculum. In addition, the Department of Finance projects a reduction in the growth of California's population, and the composition of the state's adult population is comprised increasingly of people who participate less in the broad range of adult education.

Finally, the community colleges' participation rates are at their lowest levels in 25 years; thus, current enrollment projections for the community colleges can only be attained by raising participation rates from 67 per 1000 adults to 79 per 1000 adults over the next seven years, and then maintaining that rate for the following seven years. Both the Department of Finance and CPEC believe that the participation rate at the community colleges will increase more slowly over the next decade to a level of 72 per 1000 adults, and then level off. While CPEC does not directly address the impact of fees on enrollment, CPEC implicitly assumes that price increases and lower levels of funding will depress community college enrollment. By contrast, the community colleges assume an economic recovery driving up revenues for Proposition 98, and fee increases equal to cost-of-

living increases. At this point, the more conservative and modest enrollment trends projected by the Department of Finance and CPEC appear to be more realistic.

CCC Enrollment Projections

Year	*CCC*
1994/95	1,350,098
1999/00	1,666,525
2004/05	1,850,074
2005/06	1,878,426
Growth to 2004/05	499,976
Growth to 2005/06	528,328

Source: CCC, 15-year Enrollment Forecast, California's Community Colleges.

7. The RAND Corporation

An intriguing addition to the discussion of enrollment projections is the work of Michael Shires, who developed undergraduate enrollment projections to the year 2005 for all segments—CCC, CSU, and UC—as part of his dissertation research at the RAND Corporation's Graduate School. Presently, Dr. Shires is refining his dissertation work as a research fellow at the Public Policy Institute of California.

Shires' undergraduate enrollment projections are among the few that do not utilize the Department of Finance's K–12 projections data. Shires uses 1990 census data corrected for undercount in 1993, and the Department of Finance's 1993 overall state population projections. Shires' use of the census population data base is significant. Census population data allow for projections based on race and ethnicity, age, and gender for each college or university segment. In addition, Shires has separate projections for full-time and part-time enrollments.

Shires is able to examine the "access gap," defined as the difference between the *baseline demand* and the *expected demand* for college and university education. Shires' baseline demand asks the question, "If participation rates and transition (year-to-year) rates were the same today as they were before the economic recession, how many students would attend each of the college or university segments?" Briefly, the baseline data apply 1989/90 participation and transition rates to the current California population by race and ethnicity, age, and gender to generate estimates of total

demand for higher education services in each segment. Shires' expected demand calculation then adjusts the baseline demand level for the impacts of policy decisions, such as fee increases and managed enrollment strategies. These are policies that are identified by Shires as creating a net decrease in expected demand despite population growth. In sum, expected demand is defined as the actual demand for postsecondary education in light of current "enrollment depressing" policies.

Shires refers to the difference between the baseline demand and expected demand as the "access deficit." He believes that this deficit is caused primarily by increased student fees. While this conclusion is debatable, the concept of access deficit is valuable in estimating the gap between the age cohorts available for postsecondary education and those who seriously consider enrolling.

Shires' empirical approach allows him to consider a wide range of assumptions regarding the impacts of policy on demand, as well as providing a baseline for assessing the impact on the resulting level of demand. In this model, actual future enrollments contain four implicit components:

1. the underlying level of demand for each segment in the population (baseline demand),
2. the actual demand after managed enrollment strategies and fee increases (expected demand),
3. the amount of physical capacity (spaces) available on campus (capital demand), and
4. the number of spaces for which operational funding has been provided (operating supply).

In projecting future enrollments, Shires uses these components to incorporate considerations of the future supply of higher education services into his model, with the latter three components representing recent and future state-level policy choices, while the baseline set provides an estimate of demand given pre-recession policies.

Shires' projections to 2005 using census data are intermediary for the University of California: 146,000 undergraduate students during 2005/06 compared to about 153,000 as forecast by the Department of Finance and about 134,000 as forecast by the university itself. This is not surprising because Shires uses a UC participation rate ranging from 8.0 to 8.3 percent. Shires' results for Cal State in the year 2005/06 are somewhat lower: 312,000 undergraduate students, compared to about 335,000 as forecast by both the Department of Finance and CPEC's baseline projection, and 308,000 as forecast by CPEC's low alternative projection. Despite the fact that Shires finds an increase of age cohorts that typically would attend Cal State and the University of California, his projection for the community colleges in the year 2005/06—at 1.5 million students—is far below the community colleges' own projection of approximately 1.9 million students and CPEC's baseline projection of about 1.7 million.

Shires' use of census data has some important limitations. His projections for the University of California do not take into consideration private enrollment. Shires cannot use census data to differentiate transfer students from first-year students for CSU, and he ignores noncredit enrollment for community colleges. More importantly, his projections based on census population have several significant problems, including the use of cross-sectional (one-time) distributions for his projections. Finally, Shires chose to anchor his study with 1989/90 enrollment data, which coincides with peak participation rates.

Despite these limitations, Shires has introduced an uncommon method for the development and analysis of undergraduate enrollment projections. This method shows promise for understanding latent demand and also for simulating the impacts of policy decisions related to changing educational costs. For example, Shires concludes that the current college and university system based on the California Master Plan can only serve 58 percent of the demand for postsecondary education by the year 2010, with most of the "access deficit" occurring in the community college and CSU segments.

Shires' most important contributions will come in his continued analysis of higher education funding. By manipulating various inputs into the model to consider "what-if" scenarios, he should be able to assess the impact of policy alternatives. Shires asserts that during the pre-recession years, funding for higher education was driven by increased enrollment. In post-recession years, Shires finds that enrollment policies are driven by funding levels.

RAND: All Three Segments—Baseline (Ambient Demand)

Year	*CCC*	*CSU*	*UC*	*Total*
1994/95	1,370,217	300,616	127,033	1,797,866
1999/00	1,532,542	316,943	135,255	1,984,740
2005/06	1,737,934	353,663	152,934	2,244,531

Source: RAND. *Master Plan Revisited.*

RAND: All Three Segments—Expected Demand

Year	*CCC*	*CSU*	*UC*	*Total*
1994/95	1,205,953	267,560	120,656	1,594,169
1999/00	1,334,954	279,652	129,603	1,744,209
2005/06	1,513,865	312,052	146,532	1,972,449

Source: RAND. *Master Plan Revisited.*

8. National Center for Higher Education Management Systems

The National Center for Higher Education Management Systems (NCHEMS) has projections of undergraduate enrollments to the year 2005/06 for all three public segments. These projections, given as "Total FTE" (full-time equivalent students), while helpful, were not directly comparable to head counts used in other projection series. Also, the NCHEMS projections limit community colleges to credit-unit enrollment, thus omitting all noncredit enrollment like ESL or remedial classes.

Interestingly, NCHEMS provides its projections in terms of part-time and full-time enrollment. While less relevant to the UC segment, where almost all its students are full-time, the data were instructive in terms of reviewing enrollment trends at Cal State and the community colleges. For full-time students, NCHEMS used a straight-line extrapolation method that assumes a continuation of past patterns. For part-time students, NCHEMS applied a participation rate to projected growth in persons 25 to 44 years of age.

NCHEMS' enrollment projections assume: (1) that fees will remain constant (they actually have increased); (2) that the distribution by segment will remain constant (they actually have changed slightly); and (3) that college-going participation rates will remain constant (they have declined but probably will rise again).

Use of the NCHEMS projections was limited by the lack of detailed tables in their report for the individual segments.

9. Western Interstate Commission for Higher Education

The Western Interstate Commission for Higher Education (WICHE) has published projections of total public and private high school graduates, by state, to the year 2008. The methodology used is similar to that utilized by the Department of Finance (i.e., using K–12 enrollment data and calculating grade progression ratios). WICHE projections have historically under-estimated California's public total enrollment. In addition, WICHE does not provide segment-specific data. These projections were useful as an independent set of data for comparisons, and the private institution enrollment projections were considered as part of the overall portrayal of California's college enrollment.

Conclusion and Recommendations

The charge to the panel was to evaluate existing California higher education enrollment projections and provide the Center with our best judgment about the most plausible forecast of future demand for undergraduate education in the state. In this section, we provide our recommendations on the numbers most appropriate for the Center's purposes, make some observations about the current state of projections, and provide a limited set of recommendations which, if implemented, will improve the ability to project future demand.

Findings of the Panel

The undergraduate enrollment projections the panel recommends to the California Higher Education Policy Center in this report are estimates of the level of educational service needed in order to meet the commitment of the 1960 Master Plan for Higher Education. This commitment guarantees a place in a state public college or university for each qualified California high school graduate. The Center should utilize numbers that reflect a continuing commitment to broad access. *The panel determines, from the sets of projections we examined, that the "baseline" projections of the California Postsecondary Education Commission most nearly comport with our basic assumption.* This set of numbers, reflected in the "baseline" column in the chart on the following page, permits analyses of the gap between the policies of the Master Plan and actual practice, a crucial component in the public debate on higher education access.

The panel also notes that the Center may wish to use a second set of numbers, based upon the assumption that, although financial changes of the last five years will not be reversed, the sharp increases in student fees and the precipitous decline in access will not continue to occur. This assumption may provide a more realistic set of numbers upon which to base cost projections. The panel determines that the "low alternative" projections of the California Postsecondary Education Commission most nearly reflect this assumption. This second set of numbers is presented in the "low" column in the table on the following page.

Enrollment Projections by Segment for 2005/06 California Postsecondary Education Commission			
Segment	*Low*	*Baseline*	*Difference*
Community Colleges	1,633,986	1,722,170	88,184
California State University	308,267	335,396	27,129
University of California	144,169	152,930	8,761

Source: CPEC, *California Public College and University Enrollment Demand, 1994–2005.*

Additional Observations

During our deliberations, the panel was struck by several recurring themes, highlighted for us because of the intensity of reviewing these projections in a compressed time period. The panel benefited immensely from the cumulative expertise of the individuals called upon to testify. These reflections are presented in summary form below.

1. The extent to which enrollment projections are policy driven.

Sets of assumptions—about the pool of qualified high school graduates, participation rates by race and ethnicity, the resilience of the economy, and persistence rates—reflect important attitudes about public policy. For example, very small changes in the assumptions about participation rates among African-American and especially Latino students have an enormous impact on enrollment projections, for the Latino population is projected to grow at a rate much faster than the general population. These kinds of assumptions play a much larger role in the ultimate projections than do any of the technical or methodological differences between them.

2. The degree of agreement among the different projections, particularly between the two agencies responsible for making projections across segments.

Given the vast number of variables to be considered, the interaction between segmental policies, and the complexity of the process itself, the panel was struck as much by the similarities in the projections as by the differences. The congruence between the estimates prepared by the Department of Finance and the California Postsecondary Education Commission, even though they are technically different, is quite high (as shown in the tables on the following page). This fact reemphasizes the point made earlier—assumptions drive the projections.

CPEC Baseline Enrollment Projections—Undergraduates				
Year	*CCC*	*CSU*	*UC*	*Total*
1994/95	1,337,085	261,508	123,873	1,722,466
1999/00	1,525,501	277,894	131,551	1,934,946
2005/06	1,722,170	335,396	152,930	2,210,496
Growth to 2005/06	385,085	73,888	29,057	488,030

Source: CPEC, *California Public College and University Enrollment Demand, 1994–2005.*

DOF Enrollment Projections—Undergraduates				
Year	*CCC*	*CSU*	*UC*	*Total*
1994/95	1,400,000	250,600	121,800	1,772,400
1999/00	1,522,100	270,600	131,100	1,923,800
2005/06	1,717,800	334,300	153,100	2,205,200
Growth to 2005/06	317,800	83,700	31,300	432,800

Source: DOF, *1994 Projection Series, by Segment.* The DOF numbers for 2005/06 are reported in CPEC's *California Public College and University Enrollment Demand, 1994–2005.*

Difference between CPEC and DOF Projections (2005/06)		
Segment	*Difference*	*% of Base*
California Community Colleges	4,370	1.67%
California State University	1,096	0.42%
University of California	-170	-0.07%
Total	5,296	0.31%

Source: CPEC, *California Public College and University Enrollment Demand, 1994–2005.*

3. The extent to which segmental policies impact other segments.

The decision by the University of California to maintain the current 60/40 upper-division/lower-division undergraduate enrollment ratio effectively places a "cap" on transfers from the community colleges. Changing that ratio in either direction would have a significant impact on the community colleges. The Cal State policy of accepting "early" transfers (those with less than 56 semester units)

from community colleges might negatively affect community college attempts to strengthen their transfer programs. As another example, the extent to which community colleges choose to strengthen or weaken their emphasis on the transfer function will affect the four-year segments, especially Cal State. The stakes are high for all the segments and almost no policy choice solely affects the segment that makes it.

4. The extent to which segmental policies affect "demand."

Because segmental policies affect future enrollment demand, the segments have many ways to make their own enrollment projections self-fulfilling. Recruitment and retention activities are obvious examples of this fact. Segments can alter demand by either enhancing or reducing efforts to recruit new students. Policies that create incentives and actively encourage students to remain in school also have a direct impact on enrollments. Strong segmental actions to reduce time to degree would open additional slots to potential future students. Finally, for the UC and CSU segments, the number of graduate spaces within a given appropriation level obviously influences undergraduate admission space. In sum, segmental actions, irrespective of state policies regarding access, continue to play a vital role in enrollment patterns.

Improving the Accuracy of Projections

During the panel's deliberations, the invited experts identified several practices, which, if implemented, would add to the accuracy of future projections. The panel recommends the following.

1. K–12 Private School Projections.

The Department of Finance no longer forecasts private elementary and high school enrollments. The Department of Education collects and reports on existing private school enrollment, but makes no projections of private school enrollments. The recent growth in the rate (now about double the rate of public school growth) of private school attendance and the repeated and continuous overestimation of K–12 enrollments necessitates a more thorough examination of private school attendance trends. It is not clear, for example, how much of the public school enrollment decline is caused by migration out of state and how much by private school enrollment increases. These numbers are particularly important for the University of California, since a growing percentage of its entering freshman pool is drawn from the private sector. The Department of Finance should resume its projection series for private K–12 school enrollment.

2. Eligibility Study.

Many of our expert witnesses testified about the inadequacy of the eligibility pool information. It is out-of-date and in need of revision. These eligibility studies, prepared last in 1990 by the California Postsecondary Education Commission, provide vital information regarding eligibility criteria for attendance at the University of California and Cal State. If, for example, the pool for the UC segment (the top 12 1/2 percent) is too small, the university will be hampered in meeting its enrollment projections. If, on the other hand, the pool is too large, the university would be encroaching into the enrollment pool base for Cal State. Since the concept of an eligibility pool is still central to the Master Plan, accurately determining admission parameters should be a high state priority and ought to be funded.

3. Common Student Identification System.

Enrollment projections for K–12 and for higher education have dramatically declined over the last several years. The Department of Finance's higher education enrollment projections have dropped from 750,000 to 450,000 in just the last four years, caused mainly by dramatically reduced projections for elementary and high school students. While these declines may be largely attributable to out-of-state migration, the extent to which the decline can be attributed to any one cause is still a mystery. The California Basic Education Data System is the primary tool used by the Department of Finance to project persistence rates annually in elementary and high schools. Although this system is an improvement over previous tracking methods, it leaves much to be desired. It relies on teachers to report student attendance and to identify students by race and ethnicity, and is of uneven quality. In higher education, the situation is no better. Particularly frustrating is the difficulty in following students as they navigate the higher education system. The counting of students who are concurrently enrolled in more that one system, or in more than one college within a system, leads to inaccurate estimates of the numbers of students actually served in higher education. Given the fragile state of the California economy, it is incumbent that we begin laying the groundwork for establishing a student identification system that will allow the state to follow students as they progress through the school systems and segments. The proposal to assign all children social security numbers to enable policy analysts to follow their school attendance patterns needs to be revived.

4. Community College Transfer Pool Information.

Community colleges must do a better job of transmitting information to all the other segments of higher education. Cal State is particularly reliant on community college transfers. Cal State's ability to project its enrollment needs is severely hampered by the community colleges' failure to provide such information.

Appendix

Members of the Independent Panel

Chair, David W. Breneman, University Professor and Dean of the Curry School of Education, University of Virginia.

Breneman, a distinguished teacher, administrator and author, has specialized in the economics of public and private higher education. Breneman spent eight years as senior fellow at The Brookings Institution and five years as visiting professor on the faculty of the Harvard Graduate School of Education. Breneman has chaired a state higher education funding task force for Massachusetts and is on advisory committees to the Department of Education and the National Academy of Sciences. Breneman has written a number of books on higher education finance, including one on community colleges and liberal arts colleges. He is author of a Center-commissioned report, *A State of Emergency? Higher Education in California.*

Leobardo F. Estrada, Associate Professor in the Graduate School of Public Policy and Social Research at the University of California, Los Angeles (UCLA).

Estrada is a nationally recognized demographer specializing in the population of the Southwest. Estrada also serves as the director of the Center for North American Integration and Development. He has provided consultation to the population division of the U.S. Bureau of the Census. He also serves on the advisory boards of numerous nonprofit organizations and advises foundations and the private sector. Estrada is an advisor to a number of public policy organizations in California.

Gerald C. Hayward, Director, Policy Analysis for California Education (PACE).

Hayward is a policy expert in elementary and secondary education. He was chancellor of the California Community Colleges from 1980 to 1985. For a decade Hayward served as principal consultant to the California State Senate's committees on education and finance. Hayward, a former teacher and administrator in California's public schools, was honored for his service to the California Community Colleges by the establishment of the Gerald C. Hayward Excellence in Education Award, given annually to four outstanding community college instructors.

About the California Higher Education Policy Center

The California Higher Education Policy Center is a nonprofit, independent, nonpartisan organization created to stimulate public discussion and debate concerning the purposes, goals and organization of higher education in California.

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